

## Claims

1 1. A computer system having a data processing environment in  
2 which a program is divided into and executed as multiple threads,  
3 and in which said threads share and access data that is stored in  
4 a memory device, comprising:

5 means for indicating specific data that will be accessed  
6 only by a specific thread;

7 means for determining, when a thread attempts to access  
8 data, whether a specific thread indication is present relative to  
9 the data being accessed;

10 means for accessing said specific data without first  
11 performing a locking process to reject access attempts by other  
12 threads, when the specific thread indication is present; and

13 means for performing a locking process for the data being  
14 accessed before accessing the data when it is determined that no  
15 specific thread indication is present.

1 2. The computer system according to Claim 1, wherein said  
2 specific thread detects data, included in said data stored in  
3 said memory device, and said specific thread does not have a  
4 reference pointer to said data, and thereafter releases memory  
5 occupied by said data to provide storage space that is freely  
6 available.

1 3. In a data processing environment, a system in which multiple  
2 threads share and access objects, comprising:

3 flag data, provided for an object, for indicating an  
4 existence of a locality specifying that said object is to be  
5 accessed only by a specific thread;

6 means for having the specific thread access said object when  
7 said flag data for said object indicates said locality for said  
8 specific thread, without performing a locking process to reject  
9 access attempts by other threads or other objects before  
10 accessing said specific data; and

11 means for having the specific thread perform said locking  
12 process before accessing said object when said flag data does not  
13 indicate said locality for said specific thread.

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1 6. A memory management method for a data processing environment  
2 in which a program is divided into and executed as multiple  
3 threads, and in which said threads share and access objects that  
4 are stored in a memory device, comprising the steps of:

5 setting flag data indicating an existence of a locality for  
6 a specific object that is created by a specific thread and that  
7 is to be accessed only by said specific thread;

8  
9 canceling said locality indicated by said flag data before  
10 said specific object is changed so that said specific object can  
11 be accessed by another thread;

12 without performing a locking process to reject access  
13 attempts by other threads or objects, accessing said specific  
14 object when said flag data for said specific object indicates the  
15 existence of a locality for said specific thread; and

16 locking said specific object before accessing said specific  
17 object when there is no said flag data indicating a locality for  
18 said specific thread.

1 7. The memory management method according to Claim 6, wherein  
2 said step of canceling said locality indicated by said flag data  
3 for said specific object includes a step of:

4 performing said locking process, when said specific object  
5 has a locality for a specific thread, that was skipped at the  
6 time said specific object was accessed by said specific thread.

1 8. A memory management method for a data processing environment  
2 in which a program is divided into and is executed as multiple  
3 threads, and in which said threads share and access objects that  
4 are stored in a memory device, comprising the steps of:

5 setting flag data indicating an existence of a locality  
6 indicating that a specific object that is created by a specific  
7 thread is to be accessed only by said specific thread;

8 permitting said specific thread to detect an object for  
9 which flag data indicates the existence of a locality for said  
10 specific thread and said specific thread does not have a  
11 reference pointer to said object; and

12 releasing said detected object to provide additional storage  
13 space in the memory device that may be freely used.

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19 9. Computer readable code stored on computer readable medium for  
20 permitting a locking step to be skipped in certain situations  
21 relative to data in a multi-thread environment, comprising:

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27 first subprocesses for setting flag data indicating the  
28 existence of a locality for a specific object that is created by  
29 a specific thread and that is to be accessed only by said  
30 specific thread;

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36 second subprocesses for canceling said locality indicated by  
37 said flag data before said specific object is changed so that  
38 said specific object can be accessed by another thread;

11        third subprocesses accessing said specific object when said  
12        flag data for said specific object indicates the existence of a  
13        locality for said specific thread without performing a locking  
14        process to reject access attempts by other threads; and

15        forth subprocesses for performing said locking process  
16        before accessing said specific object when said flag data  
17        indicates the absence of a locality for said specific thread.

1        10. Computer readable code stored on computer readable medium  
2        for performing memory management for a program that executes in  
3        multiple threads, comprising:

4        first subprocesses for setting flag data indicating  
5        existence of a locality indicating that a specific object that is  
6        created by a specific thread is to be accessed only by said  
7        specific thread;

8        second subprocesses for permitting said specific thread to  
9        detect an object for which flag data indicates the existence of a  
10        locality for said specific thread and said specific thread does  
11        not have a reference pointer to said object; and

12        third subprocesses for unlocking said detected object so  
13        that storage space may be freely used.